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10/671,849	09/25/2003	Yang (Jeff) Jiao	372465-01501	8693

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EXAMINER

CASCHERA, ANTONIO A

ART UNIT PAPER NUMBER

2628

DATE MAILED: 05/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/671,849

Applicant(s)

JIAO ET AL.

Examiner

Antonio A. Caschera

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4 and 6 is/are rejected.
- 7) ☒ Claim(s) 3, 5 and 7-22 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 13 and 18 are objected to because of the following informalities:
  - a. The phrase, "...maximum area triangular area..." (see line 2 of claim 13) should be corrected to, "...maximum triangular area..." to conform with the language of claim 9, from which claim 13 depends upon.
  - b. The phrase, "...the triangular not area covered by..." (see line 6 of claim 18) should be corrected to, "...the triangular area not covered by..."

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In reference to claim 2, claim 2 recites the limitation of coefficient "c" in line 8 of the claim. There is insufficient antecedent basis for this limitation in the claim since only coefficients a and b are previously described in an equation within the claim.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (U.S. Pub 2003/0210251 A1) in view of Kuchkuda et al. (U.S. Patent 5,872,902).

In reference to claim 1, Brown discloses a method for improved antialiasing coverage computation (see paragraph 1 and Figure 12). Brown discloses the method implemented within a computer graphics system outputting to a display device (see Figures 10 and 11). Brown further discloses the method applicable to line drawings in a 3D graphics system (see lines 1-2 of paragraph 17 and Figure 1). Brown discloses trying to match an ideal antialiasing algorithm by drawing a rectangle around the line segment in question, thus expanding the edges of the line segment (see paragraph 27 and #310 and 320 of Figure 3). Brown explicitly discloses different types of shading depending upon pixel centers, the shading distinguishable from a background (see #302, 304 vs. unlit pixels of Figure 3) and whether the pixels are covered by both the expanded and an unexpanded rectangle, only one or neither of the rectangles (see paragraph 27, lines 5-last line of paragraph). Note, the Office interprets such drawing of an expanded rectangle from the line segment of Brown functionally equivalent to Applicant's expanding an edge of the line segment since the expanded rectangle of Brown covers pixel centers which were previously not included in the drawing of the line segment (see for example, pixels #302 and 304 of Figure 3). Brown further discloses determining whether the pixels are included in the area covered by the expanded rectangle based upon their pixel centers and provides different shading values

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based upon such determinations (see paragraph 27, lines 5-last line of paragraph and #302, 304 and 306 of Figure 3). Although Brown discloses determining the area of the pixel partially or fully covered by the line segment (see paragraphs 52-63), Brown does not explicitly disclose determining a shading value based upon interpolating between the shade of the line segment and the shade of the background. Kuchkuda et al. discloses a method and apparatus for pixel blending and antialiasing via area calculation and pixel blending (see column 1, lines 10-14). Kuchkuda et al. discloses expanding points representing line segments into rectangular polygons (see column 8, lines 43-45). Kuchkuda et al. then discloses slicing the polygons on scanline boundaries (see column 8, lines 59-60). Kuchkuda et al. also discloses dicing the scan lines into single pixels and areas of partially covered pixels (see column 8, lines 64-66). Kuchkuda et al. discloses calculating the area of a pixel using rectangular, triangular and trapezoidal area computations (see column 9, lines 1-11). Kuchkuda et al. then discloses processing pixlink values (comprising R,G,B, A and Z values), pixlink values output from the previous pixel area calculations, by blending such values using Z or depth values of each pixlink with older pixlink values of varying depth (see column 9, lines 17-48). Note, the Office interprets the blending of pixlink values of Kuchkuda et al. and the interpolation between shade values of the line segment and shade values of the background, functionally equivalent. It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the antialiasing pixel area calculations and pixel blending of Kuchkuda et al. with the antialiasing techniques of Brown in order to improve antialiasing in line drawing graphics processes by saving significant processing cycles having to not sort objects while still providing antialiasing using/producing

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transparency and depth attributes (see column 5, lines 30-64 and column 6, lines 3-5 of Kuchkuda et al.). (see *Response to Arguments* below).

In reference to claim 4, Brown and Kuchkuda et al. disclose all of the claim limitations as applied to claim 1 in addition, Brown discloses the pixel centers defined by x, y coordinate values (see paragraph 30). Note, the Office interprets that since the pixel centers are defined in such x, y coordinates, the display device is inherently defined in such a manner also. Brown further discloses calculating coverage values of a pixel based upon the expanded rectangle and the pixel centers, testing whether the values are greater to or equal to zero (see paragraphs 52-56). Further, Brown discloses each of the edge of an expanded line segment having an equation describing the edges (see paragraphs 30-31).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902) and further in view of Wada (U.S. Patent 6,847,375 B2).

In reference to claim 6, Brown and Kuchkuda et al. disclose all of the claim limitations as applied to claim 1 above. Neither Brown nor Kuchkuda et al. explicitly disclose forming a first product of the shade value of a line segment and a fraction representing the area of the pixel covered however Wada does. Wada discloses a rendering process utilizing pixel colors of foreground and background objects multiplied by a fraction and (1-fraction) and summing these products to obtain a pixel value of an overlapping area of the objects (see column 2, lines 25-34, column 4, lines 34-41 and Figure 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the fractional pixel blending techniques of Wada with the antialiasing pixel area calculations and pixel blending of Kuchkuda et al. and the

antialiasing techniques of Brown in order to add semi-transparent attributes of overlapping objects to an antialiasing process without turning those semi-transparent objects opaque (see column 2, lines 5-15 and lines 38-40 of Wada).

*Allowable Subject Matter*

5. Claims 3, 5 and 7-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In reference to claim 3, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose wherein the step of expanding the edge of the line segment includes altering the equation of  $ax+by+c=0$  by adding an amount  $(|a|+|b|)/2$  to the c parameter of the equation, where a, b and c are coefficients from the equation  $ax+by+c=0$ , in combination with the further limitations of claim 3.

In reference to claim 5, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose wherein evaluating the expanded line segment computing  $ax_0+by_0+c+(|a|+|b|)/2=0$ , where a, b and c are coefficients from the equation  $ax+by+c=0$ , in combination with the further limitations of claim 5.

In reference to claim 7, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose the line segment having a slope factor

related to the slope of the line segment and a parameter proportional to an x distance between an edge of the line segment traversing a pixel and a pixel boundary, wherein an edge of the line segment traverses a partially covered pixel so as to define a triangular area, in combination with the further limitations of claim 7.

In reference to claim 8, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose wherein the step of computing the triangular area covered by the line segment includes forming a product  $\frac{1}{2} * p^2 * (1 - sf)^{-1} * sf^{-1}$ , in combination with the further limitations of claim 8.

In reference to claim 9, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose determining the area covered by an edge of the line segment traversing through a partially covered pixel by determining whether the area is greater than a predetermined limit, computing a maximum triangular area covered by the line segment, computing an area of a parallelogram covered by the line segment and then summing the two areas, in combination with the further limitations of claim 9 and claim 1, from which claim 9 depends upon.

In reference to claims 10-15, claims 10-15 depend upon claim 9 and are therefore also objected to.

In reference to claim 16, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose wherein computing an area of partially



covered pixels includes computing the difference between unity and the triangular area not covered, to find the area of the pixel, in combination with the further limitations of claim 16.

In reference to claims 17 and 18, claims 17 and 18 depend upon claim 16 and are therefore also objected to.

In reference to claim 19, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose computing a first area of the pixel not covered by the first parallel edge, a second area of the pixel not covered by the second edge and summing the first and second areas then subtracting the sum from one, in combination with the further limitations of claim 1, from which claim 19 depends upon.

In reference to claim 20, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose computing a first area of the pixel not covered by the first parallel edge and subtracting it from one forming a first difference, computing a second area of the pixel not covered by the second parallel edge forming a second difference and forming a product of the first and second differences, in combination with the claim limitations of claim 1, from which claim 20 depends upon.

In reference to claim 21, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose computing a first area of the pixel not covered by the first parallel edge, a second area of the pixel not covered by the second edge and

summing the first and second areas then subtracting the sum from one, in combination with the further limitations of claim 21.

In reference to claim 22, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose computing a first area of the pixel not covered by the first parallel edge and subtracting it from one forming a first difference, computing a second area of the pixel not covered by the second parallel edge forming a second difference and forming a product of the first and second differences, in combination with the claim limitations of claim 22.

6. Claim 2 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

In reference to claim 2, the prior art of record (Brown (U.S. Pub 2003/0210251 A1), Kuchkuda et al. (U.S. Patent 5,872,902), Wada (U.S. Patent 6,847,375 B2) and Michail et al. (U.S. Patent 6,954,211 B2)) does not explicitly disclose wherein the step of expanding the edge of the line segment includes expanding by an amount equal to  $(a+b)/2a$  in the x direction, wherein a is greater than zero, b is greater than or equal to zero and where a and b are coefficients from the equation  $ax+by+c=0$ , in combination with the further limitations of claim 2.

### ***Response to Arguments***

7. Applicant's arguments, see pages 10-11 of Applicant's Remarks, filed 03/13/06, with respect to the objection of the drawings have been fully considered and are persuasive. The

objection of the drawings has been withdrawn since the specification had been amended to corrected for the lack of reference #82 within the drawings.

8. Applicant's arguments, see pages 10-11 of Applicant's Remarks, filed 03/13/06, with respect to the 35 USC 112 rejection of claims 3-5, 7-15 and 18 have been fully considered and are persuasive. The 35 USC 112 rejection of the above claims has been withdrawn. Note, in reference to claim 2, a new 35 USC 112 issue has surfaced in response to the amendment of 03/13/06 to claim 2.

9. Applicant's arguments, see pages 14-17 of Applicant's Remarks, filed 03/13/06, with respect to the prior art rejection of claims 2, 3, 5, 7 and 16 have been fully considered and are persuasive. The rejection of claims 2, 3, 5, 7 and 16 has been withdrawn.

10. Applicant's arguments filed 03/13/06 have been fully considered but they are not persuasive.

In reference to the objection of claim 13, Applicant states that claim 13 has been amended to corrected for the informality (see page 11 of Applicant's Remarks) however no amendment has been made to claim 13. Therefore, the objection of claim 13 is maintained.

In reference to claim 1, Applicant argues that Brown's line expansion is different from Applicant's claims in that Brown, "...is not concerned with expanding only to the center of a pixel that is touched by the unexpanded line," (see page 12 of Applicant's Remarks). Applicant goes on to exhibit the differences between Brown and the application at hand by citing the specific equations used by both Applicant's invention and Brown (see page 12 of Applicant's Remarks). Further, Applicant argues, "...Brown never describes the specific criteria recite, i.e., that the line be expanded to the center of the pixel touched," (see page 12 of Applicant's

Remarks). The Office firmly disagrees and points to Figure 3 of Brown. Brown discloses the expanded rectangle #320, expanded to touch various pixel centers of the Figure 3 which were touched by unexpanded rectangle #310 (see for example, the pixel in column 2, last row of Figure 3). Surely, the feature of expanding the line to a previously touched pixel's center is taught by the above drawings of Brown. Further, in response to Applicant's argument that the references fail to show certain features of applicant's invention, specifically performing the expansion based upon the specific equation of Applicant's specification, it is noted that the features upon which applicant relies (i.e., the specific equation of  $(b/2a)+1/2=(1/2m)+1/2$ ) are not recited in the rejected claim. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Therefore, the Office maintains its current rejection based upon Brown.

In reference to claim 1, Applicant argues that Kuchkuda does not perform the blending of the present invention since the present invention is performing blending between the shade of a line segment and of a background while Kuchkuda blends multiple primitives of different depth values (see pages 13-14 of Applicant's Remarks). Kuchkuda et al. discloses processing pixlink values (comprising R,G,B, A and Z values), pixlink values output from the previous pixel area calculations, by blending such values using Z or depth values of each pixlink with older pixlink values of varying depth (see column 9, lines 17-48). The Office broadly interprets older pixlink values of varying depth equivalent the background since Z value attributes of these pixlink values would locate the pixlinks beneath new pixlinks thereby allowing blending between the

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multiple depths of pixlinks. Therefore, the Office maintains its current rejection based upon Kuchkuda.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Antonio Caschera whose telephone number is (571) 272-7781. The examiner can normally be reached Monday-Thursday and alternate Fridays between 7:00 AM and 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung, can be reached at (571) 272-7794.

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**Any response to this action should be mailed to:**

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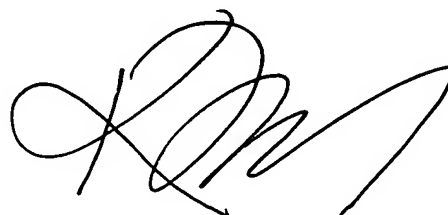
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**or faxed to:**

**571-273-8300 (Central Fax)**

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (571) 272-2600.

aac  
*me* PATENT EXAMINER  
5/19/06



**Kee M. Tung**  
**Primary Examiner**